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FORESTRY AND TREES.

(1) *Studies of Trees.* By J. J. Levison. Pp. x + 253. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1914.) Price 7*s.* net.

(2) *Forest Valuation.* By Prof. H. H. Chapman. Pp. xvi + 310. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1915.) Price 8*s.* 6*d.* net.

(3) *Chinese Forest Trees and Timber Supply.* By N. Shaw. Pp. 351. (London: T. Fisher Unwin, 1914.) Price 10*s.* 6*d.* net.

(1) THIS is an interesting book on the study of trees, specially suitable for use in the schools of Canada and the United States. Three chapters deal with the identification of the common North American trees, and of a few introduced European species, as the Austrian and Scots pines, Norway spruce, Alpine larch, horse-chestnut, Lombardy poplar, etc. Other chapters are devoted to the structure and habit of these trees, and their protection against animal and fungoid attacks. One chapter is taken up with elementary forestry, and another with the recognition and properties of the timbers in common use. The concluding chapter is an outdoor lesson on trees. The book is copiously illustrated; but, as is usual in publications of this class, the illustrations are of unequal value. The price, 7*s.*, will make it unavailable for use in schools in this country; but it deserves a place in town libraries. It is said to be obtainable in separate pamphlets, each dealing with one of the subjects treated.

The author describes in a concluding paragraph the Tree Clubs which have been founded in Brooklyn, Newark, and other eastern cities, with the object of interesting children in the care of trees. "The members of these clubs are each given the tree warden's badge of authority, and assigned to some special duty in the preservation of local trees. A plan of study and of outdoor trips is laid out for them by their director, and at stated periods they are given illustrated lectures on trees and taken to the neighbouring parks or woodlands." In happier times, we may also have tree wardens and tree clubs, which will render impossible such destruction as occurred two or three years ago in the felling of the beautiful relic of an ancient wood, the King's Hedges, near Cambridge, as soon as it had become the property of the county council.

(2) Forest valuation is concerned with the determination of the value of standing timber, of the land on which it grows, and of the forest as a whole, as well as with the rental produced. It compares also the financial results obtained in forestry with those yielded by other enterprises, and solves the merits of different methods of treatment of the forest. The importance of forest valuation cannot be gainsaid, as woods and plantations must be valued in all cases of sales, and whenever the property is assessed for taxation. Moreover, when schemes of afforestation are being considered by the State, by corporations, by companies, or by private owners, the only possible inducement for such undertakings must be based on the financial results that are reasonably to be expected. The correct appreciation of such results is by no means an easy matter. Forestry valuation deals with periods of time which are much longer than those that are ever considered in other financial considerations. Life insurance has an average risk of fourteen years, and earns about 4 per cent., obviously attracting much capital. Forests, in some cases, as coppice, bring in returns in ten to twenty years; but as a rule 40 to 120 years is the age of an ordinary plantation when felled. It is not yet agreed what rate of interest should be earned on the capital invested in forestry; and, in addition, correct and full data on which to base the calculations of the financial returns are not available in this country.

An extensive literature on the subject has been developed during the past seventy years by numerous German and French writers; but in England we have only had two serious writers—the late Dr. Nisbet and Sir W. Schlich. The latter, in his "Manual of Forestry," vol. iii., pp. 111 to 164, presents the gist of the matter in a condensed form, somewhat difficult to students who have not been previously trained, both in economics and in actuarial methods.

Prof. Chapman's book is fairly complete and has great merits. The subject proper is prefaced by four excellent chapters entitled "Values," "Outlay and Income," "Interest," and "Valuation of Assets," which will enable the student to understand the principles underlying the business of forest production. The succeeding chapters are highly technical, yet at the same time very practical, as befits a professor in an American university. He introduces, for example, a number of forms for use in forest book-keeping.

In the chapter on profits, Prof. Chapman discusses the question of private *versus* State ownership of forests; and considers it impossible for private forestry to be practised now on a large scale. He adduces conclusive reasons why the Government of the United States must continue to increase the extent of the national forests, and to take on itself more and more the production of timber. The book is replete with useful formulæ and tables, and can be recommended as the best text-book on forest valuation yet published in the English language.

(3) This book on the forest trees and timber supply of China undoubtedly contains some interesting pages. The author, a Chinese customs official lately stationed in Manchuria, gives a brief history of the forests and timber trade of this region, with a description of the modes of felling timber and rafting it on the Yalu and Sungari rivers. His slight sketches of the forest conditions of the other provinces occasionally give some information of value. It is sad to learn that the ancient hunting forest of the emperors, the Weichang in Chili, which Colonel Wingate estimated to be 400 square miles in extent in 1910, is now reduced to 100 square miles, owing to the ravages of the peasants since the revolution. Foochow and Hunan appear to be the most prolific of the provinces in timber supply; but great forests also exist in Szechwan, Kweichow, and Yunnan, which are as yet inaccessible. Until, however, a report is made by some competent forester, it is impossible to gauge the wealth of timber in the interior of China, as many of the forests reported by missionaries and travellers, while botanically marvellous owing to the variety of the shrubs, trees, and herbs, contain only a sparse supply of useful timber trees.

The volume is an uncritical compilation from various books, journals, and official reports, which are indicated in a bibliographical list. It is unfortunate that most important sources of correct information have not been consulted, such as Bretschneider's learned volumes, "European Botanical Discoveries in China" and "Botanicon Sinicum." The "Index Floræ Sinensis," an enumeration of all known Chinese plants, showing their exact distribution, which was issued by the Linnean Society, has not been used by Mr. Shaw, who scarcely appreciates the necessity for correct nomenclature. The *Kew Bulletin,* which in many volumes contains excellent notes and articles on Chinese trees and their peculiar products, is not quoted. Valuable papers on the Chinese names of trees and shrubs, which appeared some years ago in the journals of the Shanghai and Tokyo branches of the Royal Asiatic Society, have escaped notice.

The book has consequently no scientific value; and its numerous errors and omissions cannot be dealt with in a brief review. One may, however, give an instance. Mr. Norman Shaw prefaces a confused account in six pages of an important coniferous genus, with the statement that "the different species of pine in the Chinese region appear never to have been classified." Is he unaware that his namesake, Mr. G. R. Shaw, has fully described the Chinese pines in his great monograph, "Genus Pinus," and in vols. i. and iv. of "Plantæ Wilsonianæ"? The fascinating notes appended to the latter by Mr. E. H. Wilson would have provided our author with trustworthy readable matter, and saved him from such erroneous statements as that *Pinus maritima,* a Mediterranean species, is a native of China; and that *Pinus koraiensis,* a northern type not growing wild south of Korea, is met with in southern China.

The Chinese names of trees are not invariably given, and are often incorrect. Confusion of names apparently accounts for such errors as that the leaves of the Ailanthus (*Chou-chun,* p. 204) are used as a vegetable, the species thus employed being *Cedrela sinensis* (*Hsiang-chun*); and that the wood used for musical instruments is Sterculia (*Wu-tung,* p. 256), whereas it is *Paulownia tomentosa* (*Pao-tung*), a beautiful and common tree in China, not mentioned in this book. It is the pine-apple and not the screwpine (p. 307) which yields the fibre used in making fine cloth in Yunnan. Botanical errors are numerous, as the inclusion amongst Manchurian conifers of three species, *Larix leptolepis, Picea hondoensis,* and *Picea polita,* which are confined to Japan.

The section of the work, pp. 203–309, devoted to trees is inadequate and confused; and we advise readers interested to consult the books indicated by us above, and, in addition, Mr. E. H. Wilson's "Naturalist in Western China," which is replete with valuable and correct information about Chinese trees and their products.

Mr. Shaw's forestry is as unsatisfactory as his botany. We eagerly opened the book to learn something about the extensive afforestation carried on since 1899 in the German colony of Kiaochao. This is dismissed in a short paragraph giving scarcely any information about the species employed and their success or failure. Tree planting at Weihaiwei and Hongkong, effected by the British Government, receives equally inadequate treatment. As the author mentions amongst his correspondents Prof. Baillie, of the Nanking University, one expected a full account of the interesting forestry work begun by the latter in Kiangsu. Mr. Shaw merely says (p. 81) that "credit is due to Prof. Baillie for his afforestation scheme on the hills near the old capital."

The Nanking professor s pioneer afforestation work, based on co-operation with the Chinese gentry, deserved description. Some details were published in the *National Review* (China) of April 25, 1914, the list of species employed being given, etc. The great difficulty of afforestation in China seems to be danger from fire, 200,000 trees, for example, having been burnt in the experimental plantation on Purple Mountain in 1913. Professor Baillie since then has established fire-lines, 30 to 100 ft. wide, which are let to Chinese farmers, who keep these lines cultivated and at the same time take care of the adjoining plantations.

The book is illustrated by thirty-three reproductions of photographs, some of which have appeared in well-known books of travel. Those taken from Major Osaki's "O Ryoko" represent well the methods of logging and rafting timber in Manchuria. Twelve photographs by Mr. Purdom, a recent plant collector in North China, are of unequal merit, that of the Chinese horse-chestnut being the best. There is also a good picture of *Pinus bungeana* at Peking, a tree often planted in temple grounds, the bark of which is of a milky-white colour, and peels off in patches like a plane, thus giving the stem an extraordinary appearance.

DYNAMOMETERS.

Dynamometers. By Rev. F. J. Jervis-Smith. Edited and Amplified by Prof. C. V. Boys. Pp. xvi+267. (London: Constable and Co., Ltd., 1915). Price 14*s*. net.

THE late Mr. Jervis-Smith, a vicar at Taunton until in 1886 he took charge of the Millard engineering laboratory at Oxford, was a very modest and ingenious enthusiast in the experimental study of natural science. He was particularly absorbed in the study of methods of measuring mechanical power. A dynamometer measures the product of force into velocity. The chemical balance illustrates the great accuracy with which we can measure force and there is also great accuracy possible in measuring speed, but the measurement of their product with accuracy is a very different thing. To measure the electrical power given out by or given to a machine is very easy; however large or small the power may be, our measurements may be made accurate to the fourth or even to the fifth significant figure. It is only in very exceptional cases that the measurement of mechanical power is correct to two significant figures.

Mr. Jervis-Smith left his MSS. in an incomplete form. The book is not a mere collection of lecture notes; many parts of it are quite finished, but on the whole it is rather disconnected. The author's sympathetic and admiring friend, Prof. C. V. Boys, has edited the book, and he has done this evidently as a labour of love. He has not attempted to make the book a complete treatise, but he has introduced between brackets interesting statements and amplifications which tend to make it a connected whole.

The author does not confine himself to dynamometers. He gives accounts of integrators, planimeters, and other contrivances which are related in one way or another to his main subject. We get the idea that this is a scrapbook in which he placed anything that interested him. There are places—as at the beginning, but elsewhere also—where he is evidently writing a book, but in other places we have evidence of scissors and paste. It seems to have been his intention not just to print these scraps, but to use them as a foundation for better descriptions of his own. We are glad to have them, as they would otherwise have to be searched for in many publications, and although some of them might have been omitted with advantage, we regret that they are not more numerous.

There are parts, as when he deals with friction and planimeters, where he gives a valuable, exhaustive list of references. If he had lived he would no doubt have done the same for other parts of the subject. Sometimes, as in the rope dynamometer brake (p. 71), the descriptions are not easily understood as no figure is shown, and indeed all the rope dynamometer part is rather weak. The descriptions of the water brake of Froude and other things are too long and yet simple explanations are wanting. A certain air brake is described in too much detail, and the account of the behaviour of a copper disc moving in a magnetic field is tedious. The account of Borda "On the Flow of Fluid from Orifices in Vessels" is quite out of place in this book. A short account of General Morin's work on friction would be better than a translation of the original paper. We feel sure that if the author had lived he would have made the whole book as perfect as part of it is, but we can understand why the editor may have been unwilling to discard or alter too readily some of the things we have mentioned. After all they are interesting. The book gives the most interesting and complete account of dynamometry that is known to us, and it owes a great deal of its interest to the additions made by the editor. In a few places we think that Prof. Boys is not quite fair. Mr. S. G. Brown did not merely